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November 20, 2000

BOX PATENT APPLICATION
Assistant Commissioner for Patents
Washington, D.C. 20231

Re: Application of **Pierre DUPUY**

A METHOD AND APPARATUS FOR TRANSMITTING DIGITAL DATA
Our Ref. Q61862

Dear Sir:

Attached hereto is the application identified above including 18 sheets of the specification, claims and abstract, 2 sheets of formal drawings, executed Assignment and PTO 1595 form, and executed Declaration and Power of Attorney. Also enclosed is the Information Disclosure Statement.

The Government filing fee is calculated as follows:

Total claims	<u>10</u>	-	20	=	<u>0</u>	x	\$18.00	=	<u>\$0.00</u>
Independent claims	<u>2</u>	-	3	=	<u>0</u>	x	\$80.00	=	<u>\$0.00</u>
Base Fee									\$710.00
TOTAL FILING FEE									\$710.00
Recordation of Assignment									\$40.00
TOTAL FEE									\$750.00

Checks for the statutory filing fee of \$710.00 and Assignment recordation fee of \$40.00 are attached. You are also directed and authorized to charge or credit any difference or overpayment to Deposit Account No. 19-4880. The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16 and 1.17 and any petitions for extension of time under 37 C.F.R. § 1.136 which may be required during the entire pendency of the application to Deposit Account No. 19-4880. A duplicate copy of this transmittal letter is attached.

Priority is claimed from November 22, 1999 based on French Application No. 9914634. The priority document will be filed at a later date.

Respectfully submitted,
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A METHOD AND APPARATUS FOR TRANSMITTING DIGITAL DATA

The present invention relates to a transmission method and apparatus usable essentially for transmitting digital data, in particular data formatted in the General
5 Packet Radio Service (GPRS) standard. In a preferred use, the invention is implemented in the context of transmitting data to a mobile telephone, e.g. to display on the screen of the mobile telephone the results of a visit to an Internet site. More generally, the invention
10 is for adapting the GPRS protocol to equipment implemented for radio transmission of the type used in the Global System for Mobile Communications (GSM).

BACKGROUND OF THE INVENTION

Implementing the GPRS protocol requires certain
15 magnitudes, and in particular certain bit rates to be used that present practical difficulties when the data is to be carried over paths used in telephony. For example, in GSM mode, provision is made to distribute thirteen frames in 60 milliseconds (ms). This leads to each of
20 the frames having a duration of 4.61538 ms. In GPRS mode, this base duration of 60 ms is designed to take three data messages, or three data blocks over a circuit. Each data message or block is distributed in compliance with GSM mode over four time windows each of
25 577 microseconds (μ s) (assuming there are eight time windows per frame). In practice this leads to having a data rate of one data message per 20 ms duration. Consequently, provision is made for the operation of the various pieces of transmission equipment involved from
30 one end of the chain to the other to be synchronized on 20 ms (50 Hz).

To transmit data to a mobile telephone, the necessary fixed equipment comprises, in a base station (BS), equipment known as a base station controller (BSC).
35 The BSC equipment controls a base transceiver station (BTS) constituting a radio interface between the BSC and a mobile telephone. A BSC controls one or more BTSs. It

manages the radio resource: it allocates channels for calls and it takes decisions concerning base station transfer (handover). Allocating a channel comprises designating time windows in the frames and carrier
5 frequencies or encoding laws for TDMA or CDMA type systems respectively (time division multiple access or code division multiple access respectively). In order to limit the cost of transceiver stations with fixed BTS equipment, the BTS equipment does no processing other
10 than digital-to-analog conversion and modulation or amplification processing. In practice, links between BSCs and BTSs comprise channels rated at 16 kilobits per second (kbit/s), and actually implemented as 64 kbit/s channels each capable of carrying four paths. Other data
15 rates could have been selected. Nevertheless, for mass production reasons, the equipment now in place and the equipment which is being installed nowadays, is made with that rate limit.

When transmitting data packets or messages in GPRS
20 mode, several working rates have been envisaged. Thus, there are coding schemes of types CS1, CS2, CS3, and CS4 capable respectively of carrying payload data rates equal to 8800 bits/s, 12,800 bits/s, 15,200 bits/s, and 20,800 bits/s, respectively. In practice, the numbers of
25 bits transmissible in a duration of 20 ms (corresponding to the GPRS repetition rate) are then respectively 176 bits, 256 bits, 310 bits, and 416 bits. When the data rate in a channel between the BSC and the BTS of a base station is restricted to 16 kbit/s, then the times
30 required for transmitting these payload bits are respectively 12 ms, 17 ms, 21 ms, and 28 ms. In theory, these transmission times should be less than the values given above, but because of the need to encapsulate the payload bits that are transmitted over the channel at
35 16 kbit/s, the time required for sending both the data and the signaling leads to the overall times given above. These various coding schemes are organized so that within

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frames of 1500 bytes (i.e. 12 kilobits), the contribution given to redundancy becomes smaller and smaller on going from CS1 protocol to CS4 protocol.

In any event, it can clearly be seen that the time required for transmitting data corresponding to data messages of CS3 type lasts for 21 ms, i.e. longer than the time available at the GPRS repetition rate. As a result of this situation, sending a data block with CS3 type encoding will lead to transmission between the BSC and the BTS of a duration that is longer than the repetition period. Consequently, a following repetition period will need to be ignored in order to make it possible in a third period to consider transmitting a second CS3 type block. This leads to the paradox whereby although the theoretical CS3 bit rate of 15,200 bits/s is greater than the CS2 bit rate of 12,800 bits/s, the real rate actually achieved when using CS3 (with lower redundancy and thus greater fragility relative to the channel) actually takes place at a rate of about 7700 bits/s. This rate is less than the CS2 rate, and CS2 is, in addition, better protected.

OBJECT AND SUMMARY OF THE INVENTION

The object of the invention is to ensure that with the less well protected CS3 type encoding, the actual rate is at least greater than that of the better protected CS2 type encoding. It is explained below that the usable data rate with the CS3 type encoding when using the invention is equal to twelve-thirteenths of the theoretical rate, i.e. 14.03 kbit/s. This leads to a loss of approximately 7.7% compared with the theoretical rate. Nevertheless, even with this reduction, the CS3 rate remains 9.6% higher than the CS2 rate. It is also shown that if the radio channel for transmission between the base station and the mobile telephone is not very good, CS3 can accommodate a bit error rate of up to 8% without its overall rate being excessively affected.

Although the invention is also applicable to CS4 type encoding, its usable rate drops from the theoretical rate of 20.8 kbit/s to 14.4 kbit/s. That is to say almost the same (only a little better) than that of the CS3 type encoding. Nevertheless, it will be observed that this disadvantage is of little importance since normal radio transmission conditions make this coding scheme impractical for most of the time. Since this scheme is not protected by sufficient redundancy, its error bit rate is very high. Under such circumstances, the usable bit rate drops very significantly.

The invention also seeks to remedy the above drawbacks in a manner that is particularly simple.

One of the solutions that could be used for remedying this problem would be either to increase the usable bit rate of the channels providing links between BSCs and BTSs, or else to place all of the circuits for adapting, decoding, and correcting the protocols of bits received and of bits to be transmitted in the BTSs. Nevertheless, such a solution would suffer from the drawback of requiring BTSs to be fitted with processing means, which would increase the cost thereof considerably whereas the resources already available in the BSCs are capable of performing the functions of adapting and converting protocol without special difficulty. Without going into details, protocol adaptation or conversion consists, essentially, in transforming a packet transmission code usable upstream from the BSC circuits in the GPRS standard into a mode suitable for transmission over the circuits that are usable downstream therefrom. By selecting the circuits connected to the subscriber to be reached, the BSC circuits implement a final stage in the circuit switching that is required for conveying the message.

Compared with the above expensive solutions, it would also be possible to provide for abandoning the

repetition rate. However such a solution would not be compatible with the standards in force.

The invention thus provides transmission apparatus comprising a first relay receiving data messages formatted in a first protocol from a transmitter and converting the data received in this way into data formatted in a second protocol, a second relay connected to the first relay and receiving the data messages formatted in the second protocol and transmitting them in a synchronous mode to a receiver, and a limited data rate transmission channel interconnecting the two relays, wherein, since said data messages formatted in said second protocol can be of different lengths, said apparatus includes means for transmitting said data messages that can be of different lengths over said limited data rate transmission channel in an asynchronous mode.

The invention also provides a transmission method comprising the following steps:

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20 · receiving, in a first relay, messages formatted in
a first protocol and coming from a transmitter;
 · converting the data received in this way into data
formatted in a second protocol;
 · transmitting the data formatted in the second
25 protocol to a second relay connected to the first relay
by a limited data rate transmission channel; and
 · transmitting, in a synchronous mode, the data
formatted in the second protocol from the second relay to
a receiver;

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30            wherein said data messages formatted in said second  
protocol can be of different lengths, said method  
including transmitting said data messages capable of  
having different lengths over said limited data rate  
transmission channel in an asynchronous mode.

35 BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood on reading the following description and on examining the

5       · Figure 1: a block diagram of transmission apparatus of the invention;

      · Figure 2: a timing chart showing various standardized transmission schemes in the GPRS protocol; and

10       · Figure 3: a timing chart showing how a channel is used between the two relays, in the prior art and in the invention.

Figure 1 shows transmission apparatus of the invention. This transmission apparatus comprises a first relay 1 receiving data messages from a transmitter 2 that are formatted in a first protocol. To clarify ideas, the relay 1 is a base station control circuit (BSC) of a base station (BS) 3. In practice, the same control circuit 1 can govern one or more second relays such as 4. In this case, the second relays 4 are merely the radio transceivers (BTS) constituting a radio interface between the first relay, the BSC circuits 1, and receivers such as mobile telephones 5. In the context of mobile telephony, or more generally in transmitting data to mobiles, the BSC 1 has means, in particular processor units 6 implementing programs 7, for managing data communication between the BTSs 4 and the mobiles 5. In the programs 7, this management is identified by a subprogram 8 referenced GSM in this case. In practice, a BTS 4 receives over a transmission channel 9 data which has already been formatted in a GSM protocol. In the BTS 4, complex processing is undertaken. In particular, the BTS is capable of implementing forward error correction (FEC) methods and error detection methods. These methods are used in particular to detect whether a received block is valid or not. The data is symbolized in this case as being transmitted to a digital-to-analog converter (DAC)

10 of the BTS 4. This digital-to-analog converter 10 is also capable of performing modulation and variable gain amplification of radio signals intended for the mobile 5. Preferably, in order to reduce cost, a BTS 4 contains only a radio transmitter portion (and a receiver portion) together with means for performing modulation and digital-to-analog conversion. These circuits are very simple. The channel 9 also suffers from the drawback of being rated for a limited data rate, in this case commonly to 16 kbit/s. This drawback is associated with an advantage: base station equipment can be standardized and of low cost.

The transmitter 2 in this case is a transmitter transmitting data signals formatted in the GPRS standard over a transmission channel 11. As explained in the book "Réseaux GSM-DCS" [GSM-DCS networks] by Xavier Lagrange et al., Editions Hermes, Paris 1997, at pages 326 et seq., the GPRS defines a packet switched network architecture with management of mobility and access by radio. A GPRS network can be connected to various fixed data networks relying on various protocols: Internet protocol (IP), and also X25, connection-oriented protocol, and connectionless network protocol (CLNP). In addition, a plurality of GPRS networks can be interconnected.

Figure 1 shows that for this purpose the transmitter 2 has a serving GPRS support node (SGSN) 12 which is connected to one or more base stations such as 3. The node 12 is connected to a packet transmission network 13, an X25 network, or the Internet, for example, via a gateway GPRS support node (GGSN) 14. The gateway node 14 can be connected to one or more data networks such as the network 13. The node 14 is a router which enables packets coming from external data networks to be conveyed via the node 12 to the base station 3, in particular the control circuits 1 of said base station 3.



In the description above, the first relay 1 receives data in a GPRS protocol from the transmitter 2, and transmits it to the second relay 4 in a second protocol, in this case the GSM protocol. The second relay, the  
5 base station 4, transmits the data to the receiver 5. Naturally, the installation also operates in the opposite direction. Protocol conversion could also be different from the adaptation mentioned above, and could even be reduced to mere relaying.

10 In a characteristic of the invention, the second relay, in this case the BTS 4, includes a buffer memory 15 which is preferably of the first-in-first-out (FIFO) type. It is not necessarily of this type if transmission to the mobile takes place in packet mode (assuming each  
15 packet has an order number). To simplify the diagram, a memory 15 is shown in the form of a rotating memory having a write input 16 for the memory 15, and a read output 17 from the memory 15. Naturally, the memory does not revolve mechanically, but write address pointers and  
20 read address pointers merely allow new data to be written in new cells of the memory 15 and allow data that has been previously been written to the cells to be taken therefrom. The bus 9 is thus connected firstly to the input 16 and secondly to a control input 18 for  
25 controlling the circuits 10 that perform digital-to-analog conversion, modulation, amplification, and radio transmission. The input 18 which receives the signaling that accompanies the packets to be transmitted enables the circuits 10 to be adjusted. Shown in this way, the  
30 memory 15 is preferably of the FIFO type, with messages I to V being stored therein in that order prior to being extracted therefrom in the same order. On the received side, the same type of connection is implemented.

In an improvement of the invention, the memory 15 is  
35 associated with a decoder 19 that is also connected to the bus 9 and that is capable of receiving an instruction to retransmit a message that has previously been stored

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circuit 10 is modified. Under these conditions, it is possible to envisage moving on to the CS4 scheme. In which case, the various channels such as 9 can be used to feed the various memories 15 or 20 or more generally a common memory of larger size. If a message such as the message 0 needs to be repeated, then there will be no need for the message to be repeated in the same time window.

Although the description above is made on the basis of implicit addressing between a 16 kbit/s channel 9 and a radio time window for GSM transmission, in the future explicit addressing will exist. This explicit addressing will either be conveyed by a signaling channel between the control circuit 1 and the BTS 4, or else the explicit addressing will be transmitted in packet mode in the messages such as I to V that the BTS 4 will then be capable of interpreting. Under such conditions, a time window can be designated at the last moment, thus making the buffer memory that much more advantageous.

Figure 2 summarizes the various coding schemes CS1 to CS4 that can be used for transmitting data in the GPRS protocol. In this protocol, 1500-byte frames, i.e. 12 kbit/s, are conveyed in packets. Each packet has an address portion 21, a payload data portion 22, and a payload data redundancy portion 23. In addition, each packet includes synchronization information SY, transmitter power information P, and signaling SI. The synchronization signals enable the operation of the BTS 4 to be timed. In this case they are used at least for timing the read pointer 17. The power signals P are used in conventional manner for controlling the power operation of the transmitter circuits 10 via the input 18. The signaling signals can be signals of various types, and in particular, in the context of the invention, can include instructions suitable for being decoded by the decoder 19. From the scheme CS1 to the scheme CS4, the payload data portion becomes larger while

Figure 3 shows transmission mode in the state of the art and in the invention respectively. A first line at the top of Figure 3 shows sequentially in time: messages to be transmitted numbered I to VIII and having transmission durations that depend on the coding scheme used and that are marked. These durations are 12 ms or 22 ms in this example. The second line from the top of the figure shows the effects of the timing imposed by implementing the GPRS standard directly without desynchronization and without waiting time. In effect, the second line shows how the channel 9 is occupied when it is run in application of the GPRS standard. In this case, 20 ms time windows are provided. To enable a data message, e.g. message I, to be transmitted in a time window, it is necessary for the message firstly to have been received in full in the circuits 1 before the beginning of the time window that is to be used for transmitting it. This applies, for example, after 20 ms for message I, so the message I can be transmitted for a duration of 12 ms during a second window. Between the times extending from 32 ms, the end of transmission of message I, and 40 ms, the beginning of the third window, the channel 9 is unoccupied. At 40 ms, message II which was received between times 12 ms and 34 ms can be

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are allocated to the same mobile telephone). There is no risk of the memory saturating. Under such conditions, the transmission link between the BSC circuits and the BTS relay is at its maximum capacity: 16 kbit/s.

5 As mentioned above, GSM transmission mode possesses a data rate in excess of 16 kbit/s. At such a higher data rate, during the fourth period 60 ms to 80 ms, the message II available in the memory 15 can be sent by the base station towards the mobile 5. It can easily be  
10 shown that message V, which begins to be transmitted at 120 ms, could have been sent to the memory 15 in the period situated between 98 ms and 120 ms. However, message VI, for which reception by the memory 15 terminates at time 144 ms, is unavailable for  
15 transmission during the following window 140 ms to 160 ms. This window is thus ignored. It will be observed that instructions for ignoring and controlling the memory 15 can be sent as signaling data in the messages transmitted and decoded by the decoder 19. As a  
20 result, message VI is transmitted by the base station 4 only during times 160 ms and 180 ms. Thus, it can be seen that at time 260 ms, using the invention, message X can have been sent whereas using the state of the art solution only messages I to VII can have been sent. This  
25 shows clearly the increase in data rate provided by the invention. It is observed that this data rate increase is achieved in spite of the poor data rate on the channel 9, and also while complying with GPRS mode timing.

In the state of the art as in the invention it is  
30 possible that the coding scheme CS3 which is less robust against radio transmission channel noise will cause certain messages, e.g. the message 0 as mentioned above, to be transited without success. In the state of the art, it is necessary to consider the message 0 as being  
35 another message to be sent and consequently retransmission of that message would further reduce the efficiency of transmission since the message would need

to be retransmitted over channel 9, under the control of the control circuits 1. In the invention, after message V has been sent and before message VI has arrived in full, it is possible (in particular by displacing the read pointer 17) to reread message 0 and cause it to be retransmitted by the base station 4 to the mobile telephone during the period 140 ms to 160 ms. This can be obtained by interposing an instruction E in the stream of messages transmitted over the channel 9, where the instruction E represents a transmission error and specifies message 0. The time required for transmitting the instruction E, which also needs to be decoded by the decoder 19, is itself short, about 2 ms. This duration is very short compared with retransmitting message 0 since that could have lasted for as long as 22 ms. Thus, in spite of the existence of some durations that are ignored, it can be shown that the method of the invention is capable of performing CS3 transmission at a rate that is greater than that of CS2 transmission, as mentioned above, whereas in the state of the art, such results cannot be achieved because of the synchronizations required by the various protocols.

## CLAIMS

- 1/ Transmission apparatus comprising a first relay receiving data messages formatted in a first protocol from a transmitter and converting the data received in this way into data formatted in a second protocol, a second relay connected to the first relay and receiving the data messages formatted in the second protocol and transmitting them in a synchronous mode to a receiver, and a limited data rate transmission channel interconnecting the two relays, wherein, since said data messages formatted in said second protocol can be of different lengths, said apparatus includes means for transmitting said data messages that can be of different lengths over said limited data rate transmission channel in an asynchronous mode.
- 2/ Apparatus according to claim 1, including a buffer memory in the second relay, interposed in a transmission path of said second relay to store received messages and then to transmit them to the receiver.
- 3/ Apparatus according to claim 2, wherein the second relay includes a decoder for receiving an instruction to retransmit a message and for modifying a determined order of retransmission or for storing a copy of a message that is to be retransmitted in the buffer memory.
- 4/ Apparatus according to claim 1, wherein the first protocol has a plurality of data rates for transmitting payload bits, the rate at which payload bits are transmitted over the limited data rate transmission channel being intermediate in value between the data rates of the first protocol.
- 5/ Apparatus according to claim 2, wherein the buffer memory is of the first-in-first-out type.



6/ A transmission method comprising the following steps:

- receiving, in a first relay, messages formatted in a first protocol and coming from a transmitter;
- converting the data received in this way into data  
5 formatted in a second protocol;
- transmitting the data formatted in the second protocol to a second relay connected to the first relay by a limited data rate transmission channel; and
- transmitting, in a synchronous mode, the data  
10 formatted in the second protocol from the second relay to a receiver;

wherein said data messages formatted in said second protocol can be of different lengths, said method including transmitting said data messages capable of  
15 having different lengths over said limited data rate transmission channel in an asynchronous mode.

7/ A method according to claim 6, including:

- storing a plurality of received messages in a  
20 buffer memory of the second relay; and
- performing said storage prior to the second relay transmitting the messages to the receiver.

8/ A method according to claim 7, wherein:

- a message retransmission instruction is decoded in  
25 the second relay;
- a copy of a message to be retransmitted is stored in the buffer memory; and/or
- a determined retransmission order is modified.

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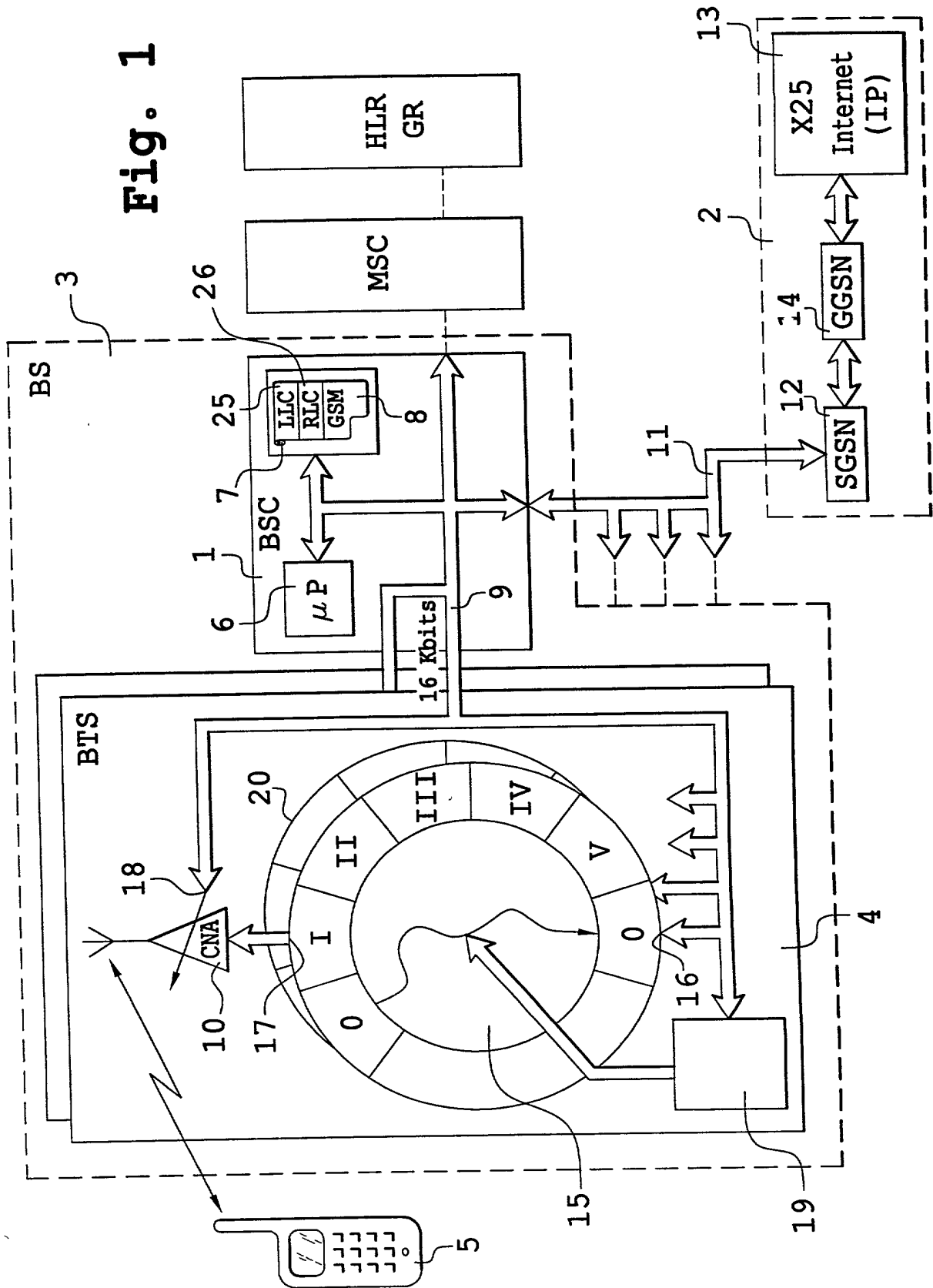
9/ A method according to claim 6, wherein the first protocol has a plurality of data rates for transmitting payload bits, the rate at which payload bits are transmitted over the limited data rate transmission  
35 channel being intermediate in value between the rates of the first protocol.

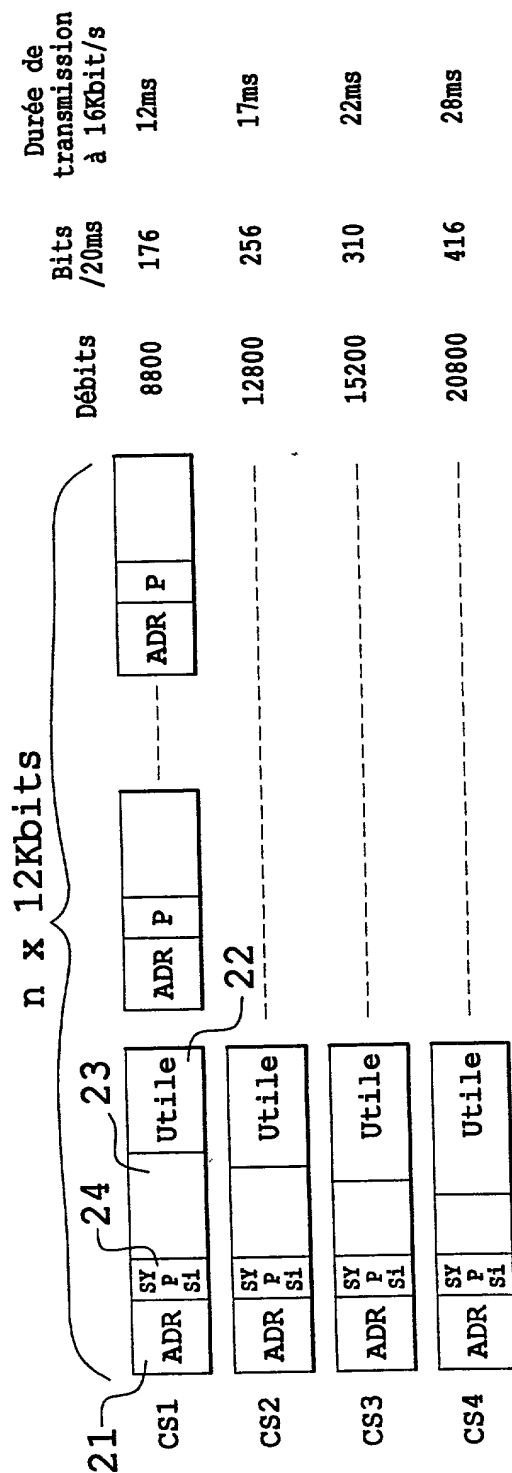
10/ A method according to claim 7, wherein storage is of the first-in-first-out type.

[illegible]

To resolve a data rate problem that results from a channel having a standardized data rate that is limited and too low between two synchronized relays, provision is made for causing the channel to be asynchronous and for providing the receiving relay with a buffer memory, preferably of the first-in-first-out type. It is shown that under such circumstances for data rates higher than the data rates of the limited data rate channels, synchronization no longer gives rise to a systematic loss of time.

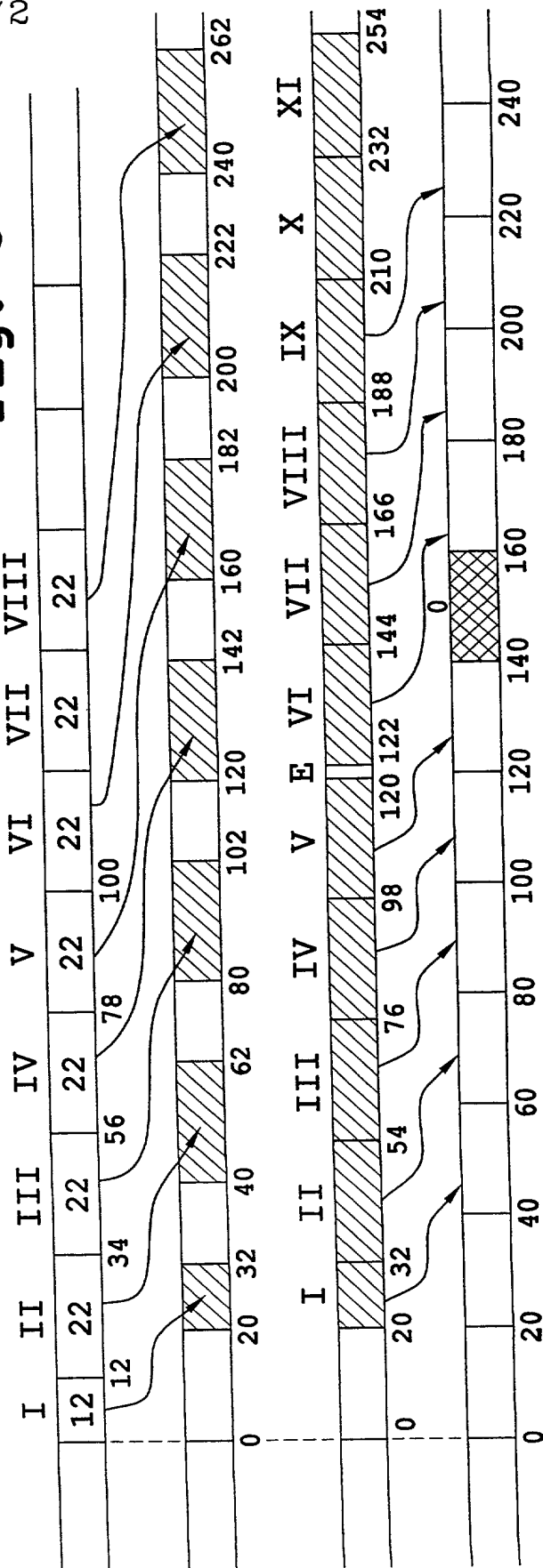
# Fig. 1





**Fig. 3**

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## French Language Declaration

### Declaration and Power of Attorney for Patent Application

### Déclaration et Pouvoirs pour Demande de Brevet

#### French Language Declaration

En tant que l'inventeur nommé ci-après, je déclare par le présent acte que

As a below named inventor, I hereby declare that.

Mon domicile, mon adresse postale et ma nationalité sont ceux figurant ci-dessous à côté de mon nom.

My residence, post office address and citizenship are as stated next to my name.

Je crois être le premier inventeur original et unique (si un seul nom est mentionné ci-dessous), ou l'un des premiers co-inventeurs originaux (si plusieurs noms sont mentionnés ci-dessous) de l'objet revendiqué, pour lequel une demande de brevet a été déposée concernant l'invention de la description identifiée par le numéro de référence

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention in the specification identified by Docket No.

#### 102274/MA/RCD

Je déclare par le présent acte avoir passé en revue et compris le contenu de la description ci-dessus, revendications comprises.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims.

Je reconnais devoir divulguer toute information pertinente à la brevetabilité, comme défini dans le Titre 37, § 1.56 du Code fédéral des réglementations.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

Je revendique par le présent acte avoir la priorité étrangère, en vertu du Titre 35, § 119(a)-(d) ou § 365(b) du Code des Etats-Unis, sur toute demande étrangère de brevet ou certificat d'inventeur ou, en vertu du Titre 35, § 365(a) du même Code, sur toute demande internationale PCT désignant au moins un pays autre que les Etats-Unis et figurant ci-dessous et, j'ai aussi indiqué ci-dessous toute demande étrangère de brevet, tout certificat d'inventeur ou toute demande internationale PCT ayant une date de dépôt précédant celle de la demande à propos de laquelle une priorité est revendiquée.

I hereby claim foreign priority under Title 35, United States Code, § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below, and have also identified below any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

Prior foreign application(s) for which priority is claimed  
Demande(s) de brevet étrangère(s) antérieure(s) dont la priorité est revendiquée

| (Number)<br>(Numéro) | (Country)<br>(Pays) | (Day/Month/Year Filed)<br>(Jour/Mois/Année de dépôt) |
|----------------------|---------------------|------------------------------------------------------|
| 99 14 634            | France              | 22/11/1999<br>(NOVEMBER 22, 1999)                    |

Prior foreign applications for which priority is not claimed  
Demande(s) de brevet étrangères antérieure(s) dont la priorité n'est pas revendiquée

| (Number)<br>(Numéro) | (Country)<br>(Pays) | (Day/Month/Year Filed)<br>(Jour/Mois/Année de dépôt) |
|----------------------|---------------------|------------------------------------------------------|
|                      |                     |                                                      |

## French Language Declaration

Je revendique par le présent acte tout bénéfice, en vertu du Titre 35, § 119(e) du Code des Etats-Unis, de toute demande de brevet provisoire effectuée aux Etats-Unis et figurant ci-dessous.

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

(Application No.)  
(No de demande)

(Filing Date)  
(Date de dépôt)

Je revendique par le présent acte tout bénéfice, en vertu du Titre 35, § 120 du Code des Etats-Unis, de toute demande de brevet effectuée aux Etats-Unis, ou en vertu du Titre 35, § 365(c) du même Code, de toute demande internationale PCT désignant les Etats-Unis et figurant ci-dessous et, dans la mesure où l'objet de chacune des revendications de cette demande de brevet n'est pas divulgué dans la demande antérieure américaine ou internationale PCT, en vertu des dispositions du premier paragraphe du Titre 35, § 112 du Code des Etats-Unis, je reconnais devoir divulguer toute information pertinente à la brevetabilité, comme défini dans le Titre 37, § 1.56 du Code fédéral des réglementations, dont j'ai pu disposer entre la date de dépôt de la demande antérieure et la date de dépôt de la demande nationale ou internationale PCT de la présente demande.

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Application No.)  
(N° de demande)

(Filing Date)  
(Date de dépôt)

(Status)(patented, pending, abandoned)  
(Statut)(breveté, en cours d'examen, abandonné)

Je déclare par le présent acte que toute déclaration ci-incluse est, à ma connaissance, véridique et que toute déclaration formulée à partir de renseignements ou de suppositions est tenue pour véridique; et de plus, que toutes ces déclarations ont été formulées en sachant que toute fausse déclaration volontaire ou son équivalent est passible d'une amende ou d'une incarcération, ou des deux, en vertu de la Section 1001 du Titre 18 du Code des Etats-Unis, et que de telles déclarations volontairement fausses risquent de compromettre la validité de la demande de brevet ou du brevet délivré à partir de celle-ci.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

## French Language Declaration

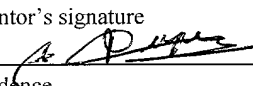
POUVOIRS: En tant que l'inventeur cité, je désigne par la présente l'(les) avocat(s) et/ou agent(s) suivant(s) pour qu'ils poursuive(nt) la procédure de cette demande de brevet et traite(nt) toute affaire s'y rapportant avec l'Office des brevets et des marques: (mentionner le nom et le numéro d'enregistrement).

John H. Mion, Reg. No. 18,879; Thomas J. Macpeak, Reg. No. 19,292; Robert J. Seas, Jr., Reg. No. 21,092; Darryl Mexic, Reg. No. 23,063; Robert V. Sloan, Reg. No. 22,775; Peter D. Olexy, Reg. No. 24,513; J. Frank Osha, Reg. No. 24,625; Waddell A. Biggart, Reg. No. 24,861; Louis Gubinsky, Reg. No. 24,835; Neil B. Siegel, Reg. No. 25,200; David J. Cushing, Reg. No. 28,703; John R. Inge, Reg. No. 26,916; Joseph J. Ruch, Jr., Reg. No. 26,577; Sheldon I. Landsman, Reg. No. 25,430; Richard C. Turner, Reg. No. 29,710; Howard L. Bernstein, Reg. No. 25,665; Alan J. Kasper, Reg. No. 25,426; Kenneth J. Burchfiel, Reg. No. 31,333; Gordon Kit, Reg. No. 30,764; Susan J. Mack, Reg. No. 30,951; Frank L. Bernstein, Reg. No. 31,484; Mark Boland, Reg. No. 32,197; William H. Mandir, Reg. No. 32,156; Scott M. Daniels, Reg. No. 32,562; Brian W. Hannon, Reg. No. 32,778; Abraham J. Rosner, Reg. No. 33,276; Bruce E. Kramer, Reg. No. 33,725; Paul F. Neils, Reg. No. 33,102; and Brett S. Sylvester, Reg. No. 32,765; and Robert M. Masters, Reg. No. 35,603.

POWER OF ATTORNEY. As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (list name and registration number)

Adresser toute correspondance à:

Send Correspondence to:  
SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC  
2100 Pennsylvania Avenue, N.W., Suite 800  
Washington, D.C. 20037-3213

|                                                    |                                                                         |                                                                                                            |                                  |
|----------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------|
| Nom complet de l'unique ou premier inventeur       | Full name of sole or first inventor (First Middle Last)<br>Pierre DUPUY |                                                                                                            |                                  |
| Signature de l'inventeur                           | Date                                                                    | Inventor's signature<br> | Date<br><b>November 06, 2000</b> |
| Domicile                                           | Residence<br>75017 PARIS, FRANCE                                        |                                                                                                            |                                  |
| Nationalité                                        | Citizenship<br>French                                                   |                                                                                                            |                                  |
| Adresse postale                                    | Post Office Address<br>14, rue Lecluse<br>75017 PARIS, FRANCE           |                                                                                                            |                                  |
|                                                    |                                                                         |                                                                                                            |                                  |
| Nom complet du second co-inventeur, le cas échéant | Full name of second joint inventor, if any (First Middle Last)          |                                                                                                            |                                  |
| Signature du second inventeur                      | Date                                                                    | Second inventor's signature                                                                                | Date                             |
| Domicile                                           | Residence                                                               |                                                                                                            |                                  |
| Nationalité                                        | Citizenship                                                             |                                                                                                            |                                  |
| Adresse postale                                    | Post Office Address                                                     |                                                                                                            |                                  |
|                                                    |                                                                         |                                                                                                            |                                  |

(Fournir les mêmes renseignements et la signature de tout co-inventeur supplémentaire.)

(Supply similar information and signature for third and subsequent joint inventors.)